(12) Utility Model Gazette
(11) Utility Model Publication No.: Japanese Utility Model Publication No. 19819/1995
(44) Publication Date: May 10, 1995
(51) Intl. Cl.[6]
B42D 9/04
A61F 13/10
Number of claim: 1
(21) Application No.: Japanese Utility Model Application No. 72762/1991
(22) Application Date: September 10, 1991
(65) Laid-Open No.: Japanese Utility Model Application Laid-Open No. 26451/1993
(43) Laid-Open Date: April 6, 1993
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(56) References:
Japanese Utility Model Application Laid-Open No. 80379/1989 (JP, U)
Japanese Utility Model Application Laid-Open No. 131611/1992 (JP, U)

(54) [Title of the device]: FINGERSTALL

[Claim of utility model]

1. A fingerstall prepared by coating an acrylic micro-emulsion of a hydrosol type water-soluble resin on an inner or outer surface or both the inner and outer surfaces of the fingerstall body and then drying the coating to provide a film.

[Detailed description of the device]

[0001]

[Field of industrial application]

The present device relates to a fingerstall made from a naturally occurring or synthetic rubber, and more particularly to a rubber fingerstall to which nontacky and lubricating

properties are imparted.

[0002]
[Prior art]
This type of rubber fingerstall has conventionally been adhesive, and thus, it has been difficult to put on and take off from a finger. At the same time, the conventional rubber fingerstall had a disagreeable feel against the skin. The conventional fingerstall also adhered to other material and was inconvenient to handle.

[0003]
[Problems to be solved]
In order to solve the above problem, antistick agents, such as powders and silicone oil were coated on the surface of a rubber fingerstall. However, upon use for a short period of time, these substances would be removed from the rubber surface, which would disadvantageously develop stickiness.

[0004]
Use of powders often affects the operating environment by scattering around. In particular, this was undesirable in the electronic field.

[0005]
[Means for solving the problem]
The present device was completed under the above circumstances, and the means for solving the problem is effected by coating an acrylic micro-emulsion of a hydrosol type water-soluble resin on an inner or outer surface or both the inner and outer surfaces and then drying the coating to provide a film.

[0006]
[Example]
An embodiment of the present device is described with

reference to the drawings. A fingerstall body 1 is produced in accordance with a well-known manner in the art, specifically a dipping process. An acrylic micro-emulsion of a hydrosol type water-soluble resin is coated onto an inner or outer surface thereof or both the inner and outer surfaces thereof according to the dipping process. The coating is then dried to provide a film 2.

[0007]

An acrylic micro-emulsion of a hydrosol type water-soluble rein is composed of a copolymer of a methacrylic acid ester monomer and acrylic acid ester monomer. Factors to be considered for selecting a monomer include hydrophilic property, high reactivity, adhesion, and a low coefficient of abrasion. Efficient monomers include methacrylic acid, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, dimethyl aminoethyl methacrylate, diethyl aminoethyl methacrylate, ethylene glycol dimethacrylate, triethylene glycol dimethacrylate, trimethylolpropane trimethacrylate, methyl methacrylate, and 2-ethylhexyl methacrylate. Particularly efficient monomers are, for example, methacrylic acid, 2-hydroxyethyl methacrylate, and 2-ethylhexyl methacrylate. These may be used as a basic monomer for copolymers in combination with other monomers.

[0008]

In the present device, a concentration of this acrylic micro-emulsion solution should be adjusted to be conformable to a fingerstall body 1. A concentration in the range of 0.1 to 5% is suitable, and 0.5 to 2% can be more effective for general fingerstalls.

[0009]

Regarding the acrylic micro-emulsion of hydrosol type water-soluble resin, a particle diameter of a particle 4 is very small, i.e., not more than 0.05 μ with a central value of the

particle diameter being not more than 0.02 μ. Thus, the emulsion particles can sufficiently enter in the concave-convex created with micro intervals among rubber particles on the surface of the fingerstall body 1.

[0010]

In order to improve solvent resistance, heat resistance and water resistance, a cross-linking agent such as a water-soluble melamine or an epoxy resin and a catalyst such as organic amines or ammonium salts are added to such an emulsion to prepare a surface treating agent. A production mold as such or a production mold with a thin film of naturally occurring rubber latex being adhered thereon is dipped in this surface treating agent. The treating agent is coated on the surface of the thin film and then dried, thereby providing a film 2 on an inner or outer surface or both the inner and outer surfaces of the fingerstall body 1.

[0011]

A formulation of this surface treating agent is exemplified as 700 to 40,000 parts of water, 1 to 4 parts of water-soluble melamine, and 0.1 to 0.4 part of organic amine catalyst based on 100 parts by weight of an acrylic micro-emulsion (40%).

When a film 2 is prepared by drying, the coverage should be considered. The film should be formed as thin as possible so as not to change the texture and appearance of the fingerstall.

[0012]

The production process according to the embodiment of the present device and that according to a comparative example (conventional example) will be described in detail.

Naturally occurring rubber latex (dry)	100 pts.wt.
S	1 pt.wt.
ZnO	1 pt.wt.

Dithiocarbamate vulcanization accelerator	0.8 pt.wt.
Anti-aging agent	1 pt.wt.
Stabilizer	appropriate amount

A fingerstall is produced by dipping a production mold into the naturally occurring rubber latex with the above formulation. The process is as shown in Table 1, and the surface treating agent in the Example comprises 4,000 parts of water, 2 parts of water-soluble melamine, and 0.2 part of organic amine catalyst, based on 100 parts by weight of acrylic micro-emulsion (solid matter 40%). Properties and performance of the produced fingerstall are shown in Table 2.

[0013]

[Table 1]

Ex.	Comp. Ex.
① Dipping in latex	① Dipping in latex
② Drying (90°C x 5 min)	② Drying (90°C x 5 min)
③ Barb winding	③ Barb winding
④ Dipping in a surface treating agent	④ Drying (90°C x 10 min)
⑤ Drying (90°C x 10 min)	⑤ Mould release (antistick agent such as powder was coated)
⑥ Mould release (without using powder)	⑥ Drying by vulcanization (80°C x 40 min)
⑦ Drying by vulcanization (80°C x 40 min)	⑦ Washing a mold (e.g., surfactant)
⑧ Washing a mold (warm water)	⑧ Rinsing a mold
⑨ Drying a mold	⑨ Drying a mold

[0014]

[Table 2]

		Ex.	Comp. Ex.
General properties	100% modulus (kgf/cm^2)	9.5	9.5
	Elongation (%)	810	820
	Tensile strength (kgf/cm^2)	355	350
	Tensile load (kgf/cm)	1.4	1.4
Heat aging	100% modulus (kgf/cm^2)	9.6	9.6
	Elongation (%)	810	850
	Tensile strength (kgf/cm^2)	354	340
	Tensile load (kgf/cm)	1.4	1.2
Lubricating properties (deg)		41	60 or more

Lubricating properties are tested by fixing a sample on a table, the slope angle of which can be freely varied, and placing 2 g of weight thereon, thereby measuring the angle with which the weight is slipped down.

* Heat aging was measured after 70°C x 72 hr.

[0015]

[Effect of device]

The present device can impart nontacky and lubricating properties to a fingerstall by coating an acrylic micro-emulsion of a hydrosol type water-soluble resin on an inner or outer surface or both the inner and outer surfaces of the fingerstall body and then drying the coating to provide a film. At the same time, the present device can provide a fingerstall having improved nontacky and lubricating properties. Provision of the film on the inner surface of the fingerstall body facilitates putting on and taking off from a finger and provides a good sense of use. In addition, since conventional powders are not used, production is very simple, and at the same time, removal of powder is not necessary. This enables use thereof in the electronic industry, filling gaps on the surface among latex particles, which are the original structure of naturally occurring rubber, and eliminating the

need to use the powder. The synergistic effect therefrom inhibits the occurrence of pin halls.

[0016]

More specifically, a hydrosol type water-soluble acrylic micro-emulsion has a particle diameter of not more than 0.05 μ, and the emulsion particles can sufficiently enter into micro intervals among rubber particles on the rubber surface and fixed thereon, thereby becoming a strong film that is durably formed on an inner or outer surface or both the inner and outer surfaces of the fingerstall body. In contrast, when treating with conventional acrylic emulsion, the particle diameter of the emulsion is 0.05 to 0.2 μ, and thus, the emulsion can only fix on the rubber surface but cannot enter into micro intervals among rubber particles. Therefore, the emulsion could be easily separated and did not have any filling effect.

[Brief description of drawings]

[Fig. 1] A partially cut front view showing an embodiment of a fingerstall according to the present device

[Fig. 2] A cross-sectional view

[Description of symbols]

1 represents a fingerstall body and 2 a micro-emulsion film of a hydrosol type water-soluble resin.